WF-Note 210
Nov. 5, 2002

EM design of Coaxial cable to circular waveguide TM01 adaptor

Wanming Liu, Wei Gai

Motivation: To design coaxial cable to circular waveguide TM01 mode adaptor for our dielectric accelerating structure experiments.

X-band structure:

For the our current x-band structure, the radius of the circular waveguide has been chosen to 12.079mm(approximately 0.951inch in diameter). The scheme of the adaptor is given in figure 1.

The cable we chose is RG58/U for which a=0.033inch and b=0.116inch. Under such conditions, the optimized parameters are t1= 0.1527inch, t2=0.4501inch and 2r=0.5125inch. The S parameter is given in figure 2.

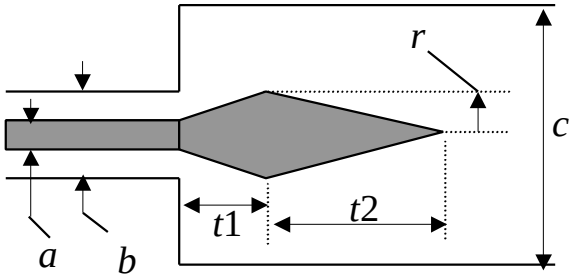

Figure 1. Scheme of the x-band adaptor

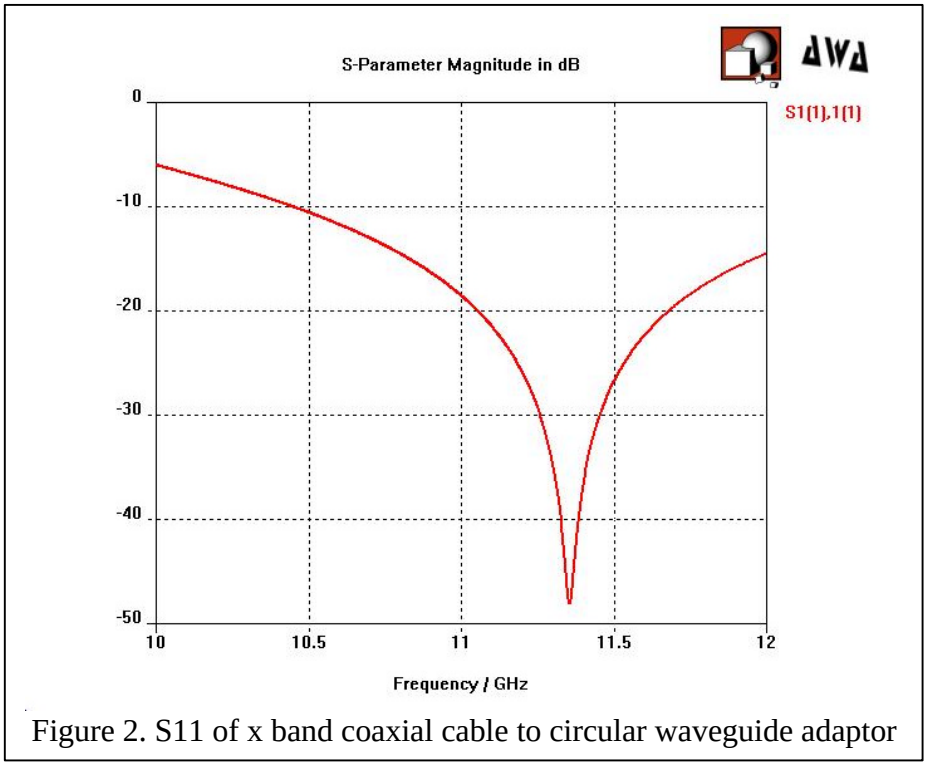

Figure 2. S11 of x band coaxial cable to circular waveguide adaptor

Duly structure:

We also made an adaptor EM design for duly structure. For duly structure, the diameter of the circular waveguide is about 0.4725inch. The cable we chose is aslo RG58/U for which a=0.033inch and b=0.1165inch. By using Microwave studio, we found, for scheme shown in figure 1, the optimized parameters are r=0.156inch, t1=0.5652inch and t2=0.3634inch. Under this optimized parameters, the S11 of this adaptor is about –30dB at 21GHz. The S parameter for this optimized structure is given in figure 3.

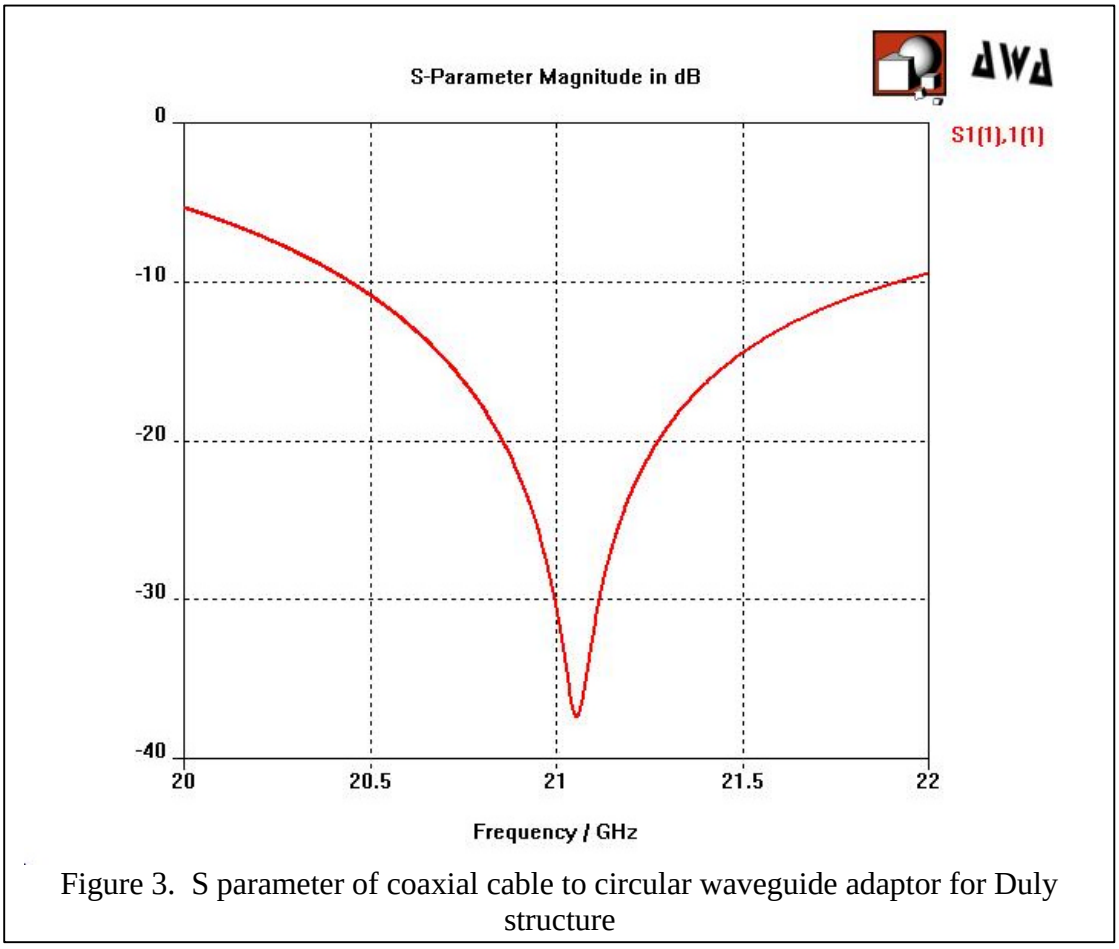

Figure 3. S parameter of coaxial cable to circular waveguide adaptor for Duly structure